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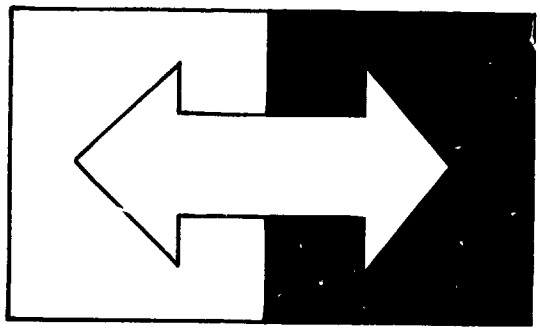

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A Division of Computer Institute
for Social Science Research
Michigan State University

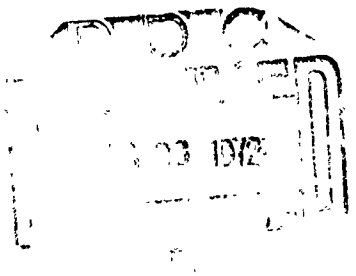
THE EFFECTS OF PERSONALITY TRAITS ON EXPERIMENTAL GAMES

by

Marsha H. Katz

Report 72-1

Cooperation/Conflict Research Group
Michigan State University



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13. ABSTRACT

This study reports on the effects that personality plays in the choice of move in experimental games. Two "trivial" games were developed, one to test the trait of trust and the other to test competitiveness. The third game used was the chicken game. It was expected that the two personality traits would interact in the chicken game such that only those who were high on trust and low on competition would cooperate. All others were predicted to defect. Competition predicted choice of move on the chicken game. The competition game was also a predictor of the choice of move on the chicken game. Sex differences were found to be significant in the moves following defection by the opponent.

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ABSTRACT

This study reports on the effects that personality plays in the choice of move in experimental games. Two trivial games were developed, one to test the trait of trust and the other to test competition. The third game used was the chicken game. It was expected that the two personality traits would interact in the chicken game such that only those who are high on trust and low on competition will cooperate. All others were predicted to defect.

The two trivial games did not predict the choice of move on the games nor did the interaction between the two personality traits predict the choice of move on the chicken game.

It was found that the competition predicted the choice of move on the chicken game. The competition game itself was also a predictor of the choice of move on the chicken game.

Sex differences were found to be significant in the pattern of moves following a defection by the opponent.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

An aspect of psychological research of great potential relevance to world affairs is the study of the influence of personality variables on reactions to mixed-motive situations. It is interesting to speculate how history might have been different if a certain leader had not been prominent at a particular time. Notable examples are the Nazi regime in Germany and the "Camelot" era during the administration of John Kennedy.

If it is true that the leader of a country may influence that country by his personality, it follows that leaders of smaller areas of concern may also have influence in that area. An ambassador in a foreign country uses his influence in that sphere to maintain certain diplomatic relations. He also imparts information to his superiors. This information may be influenced by his cognition of certain events, and this cognition may be influenced by his personality.

The description below is one example of how a person in a situation of influence had a perception of events that made a considerable impact on American foreign politics. Holsti (1961) presents evidence for the Dulles role in shaping American policy regarding the Soviet bloc. He claims that Dulles viewed the Soviet Union Government as "bad": a trinity of atheism, totalitarianism, and communism. Dulles, in order to maintain his previous ideas, either misinterpreted or

disregarded data that probably would have led other people to change their opinion of the Soviet Union.

Weber (1961) states that the more ambiguous the cognitive and evaluative aspects of a decision making situation, with the responsibility being mostly on one person, the more likely that personality variables are likely to assert themselves. In support of this view, Marquis, Guetzkow, and Heyns (1951) in a study of business, government and industrial conference groups, found that an individual in many cases was motivated by his personal needs rather than by the situation at hand. In a survey of these officials, they found that those in lower positions did not feel that personality played a great part in behavior, but those at the higher echelons said it did. This was especially true at times when information was incomplete and stress great.

This kind of analysis suggests that studies need to be done regarding the effect of personality on cognition and thus on the behavior of an individual. This is particularly important with reference to persons of much power or influence.

It is too complex a problem to study world leaders and how their personality traits effect their decisions on world affairs. This is not only because of their status and therefore their inaccessibility, but also the nature of the problem. To isolate one personality trait and determine a controlled way of testing what effect it has on decision making is difficult to do in the "real world." The possibility of running laboratory experiments with world leaders is generally regarded as infeasible and incomprehensible. But laboratory studies can be done that show that there is a relationship between personality and

behavior, or decision making. Once this relationship is established, then the analysis can be extended to the field.

Laboratory Studies of Conflict

The experimental game is a useful way to study decision making in conflict situations. The game offers a situation that involves choosing between a "cooperative" or "competitive" act. In the 2 x 2 game, there are two people each having two choices concerning the amount of payoff possible for himself and another person. Each person makes his move separately, but the joint move actually determines the payoff for each subject. Thus, the game is designed such that each player's payoff is not only dependent on his own choice, but also upon the choice the other person makes. See Figure 1 for the characteristic, normal form of the 2 x 2 game.

		Person 1	
		Choice A	Choice B
Person 2	Choice A	I	II
	Choice B	III	IV

Figure 1. Normal Form of 2 x 2 Game.

The theory of games assumes the following:

1) A person has full information, i.e., knows the alternative available both to himself and his opponent and has a knowledge of the preference patterns of the other player in the situation.

2) Each person has a preference ordering over the outcomes available .

3) People act to maximize their utility i.e., the theory assumes rational players (Luce and Raiffa, 1967).

Rapoport and Guyer (1966) indicate that there are 78, 2 x 2 games, when the payoffs are considered only on an ordinal scale. Some of those can be classified as "trivial" games. Those games have a solvable strategy for both players, i.e., if they both "perceive" the game similarly to game theory, both should behave cooperatively; both should make the choice with the highest joint payoff. They state that these "trivial" games are of no theoretical interest. And thus, they have not been dealt with in the literature. Research has basically centered on the prisoner's dilemma game and the chicken game. The preference for player I in the chicken game should be: II > I > III > IV. Figure 2 shows the matrix for the chicken game.

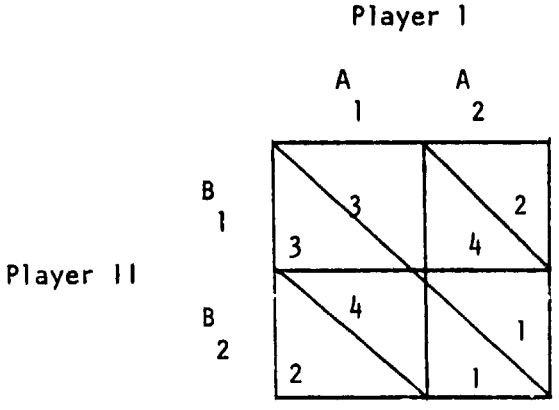

Figure 2. Chicken Game. Matrix III.

When trying for the outcome in cell II, the most preferred outcome, one takes the risk of receiving the outcome of cell IV, the least preferred outcome. Instead if player I chooses to try for cell I (his second choice), the worst that can happen is that he receives his third choice (cell III). Trying for the second choice in order not to be caught with

the last choice, is called the minimax strategy. This analysis holds true for both players.

The chicken game can be analyzed on the basis of a combination of two psychological traits: trust and competitiveness. If a person is trusting of others and not competitive, it is likely that he will choose choice A_1, believing that the other person will choose B_1. If this trusting person is competitive, then he would pick choice A_2, which would enable him to earn more. He would be taking advantage of the cooperativeness of the other person. This is, of course, contingent upon his "trust" of the other person to choose choice B_1.

If the person is non-trusting, he believes that the other person will try to get the most for himself. Thus he has two choices: take the best he can, i.e., two points and let the other person get the greater amount; or he can get even and make the other person suffer also, with both receiving the least amount.

It can be seen that the chicken game is fairly complex on a psychological level. Therefore, it is proposed that various simple games, games that are mathematically solvable, should be developed that would be dependent upon particular psychological traits. These simple games might be more useful in studying these traits in isolation. Certain games with dominant strategies can be developed that would differentiate between people on such traits as trust and competitiveness. This kind of game may prove to be as interesting psychologically as the chicken game. This could be justified by the issue that psychological interest is generated when new or unusual motives can be used to explain behavior. Thus, the failure to choose the "rational move" in a game, if it can be explained by a "new motive," is of interest to the psychologist.

It may be that "trivial" games can show this failure and isolate the motive most readily.

This study concerns itself with variables that might affect the choice of move an individual makes. What influences some people to choose the competitive instead of the cooperative move in a chicken game; or in the simpler games, what makes a person choose the non-dominant move? These variables can be subsumed under two major headings - Personality traits and Situational variables.

Personality

Laboratory studies of conflict have found contradictory results concerning the relationship between personality traits and behavior. One common explanation for this is that the situations are different in the different experiments; thus some elicit the personality traits, while others do not. Not only do some of the differences revolve around the situation, but also around the various personality traits chosen for study in any experiment. Different experiments have been concerned with a variety of personality traits in various situations. Terhune (1968) has summarized these personality and attitudinal variables studied in relation to conflict and cooperation.

A number of studies (Wrightsman, 1966; Deutsch, 1960; Lutzke, 1960; McClintock, Harrison, Strang, and Gallo, 1963; Marlowe, 1963; Terhune, 1968) have found that personality traits are correlated with cooperativeness and competitiveness in game situations.

Wrightsman (1966) attempted to assess thirteen variables assumed to be related to game behavior. He administered a pre-test a month before his Ss participated in the experiment. Ss were defined as trusting if they chose the cooperative choice on a 2 x 2 prisoner's

dilemma game and expected the other player to choose cooperatively also. These subjects had generally more positive attitudes about human nature: seeing people as more trustworthy, more altruistic, and more independent than did distrusting Ss.

Deutsch (1960) found that the F scale could be used reliably to predict game behavior. He found that the low F scorers were the most cooperative and high F scorers most competitive in the prisoner's dilemma game.

In Marlowe's (1963) study, subjects played a prisoner's dilemma game against a stooge who always played the cooperative choice. Fifteen of the 37 male Ss were consistent and extreme non-cooperators, while there were nine subjects who were cooperative. The non-cooperators scored higher than the cooperators on need for aggression and autonomy. Cooperative Ss scored higher on need for abasement and deference on the Heilbrun adaptation of the Gough Adjective Checklist.

Terhune (1968) selected Ss high in either achievement affiliation or power motive. He found that "motive does predispose individuals to play the Prisoner's Dilemma in different ways, but that these tend to be wiped out the more threatening the situation." The threatening aspect of the experiment was varied by using three different matrices for the one trial game. These matrices varied in their likelihood of producing cooperation.

Lutzke (1960) used a different procedure than the above experimenters. His subjects were rated as internationalists or isolationists[1]

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[1] An internationalist was defined as one who trusts other nations and is willing to cooperate with them. They would tend to perceive international organizations such as the United Nations as deterrents of war and consider international tension reducible by mediation.

by a pre-test before the experiment. They then were placed in pairs based on similar traits. Each of these pairs played a prisoner's dilemma game. Lutzke found that internationalists made significantly more cooperative choices than did isolationists. Thus, the internationalist, defined as trusting, was also non-competitive in the game situation. This group did not "exploit" the other person. Even though they believed that the other subject would cooperate, they did not take advantage and "defect" for the possibility of earning more money. A most interesting finding from this experiment was that his control group (selected randomly from the population of college students) did not differ significantly from the international group. Thus, it seems that the internationalists are not more cooperative than the general population of college students, but rather that the isolationists are more competitive. McClintock, Harrison, Strang and Gallo (1963) also found that internationists tend to be more cooperative than the isolationists. They found this to be the case no matter what strategy the other player used.

Sex Differences

One of the most salient characteristics is the sex of the subject, yet it is a variable that has not been studied extensively. Most experimental work is done using only males as subjects. The few findings that have been determined in experimental work are not yet sufficient to offer an acceptable explanation for the differences. Rapoport and Chammah (1965) have found males to be more cooperative than females in experimental game situations. Halpin and Pilisuk in a prisoner's dilemma game, had subjects predict the move of the other Ss and then play the game. When they predicted the cooperative move, males tended

to defect and earn more points than the females. Komorita (1965) as in the Halpin and Pilisuk study, found females to be more cooperative than males. O'Grady (1970) has duplicated both sets of results by including as a variable the type of strategy the E used against the Ss. O'Grady found that females were more competitive against a contingent strategy (tit-for-tat), which was the strategy used in the Rapoport and Chammah study, while males were more competitive against a non-contingent strategy as in the Halpin and Pilisuk study and in Komorita's study.

Vinacke's explanation that males are exploitative, while females are accommodative, seems to offer a descriptive framework that partially fits the above results. Against a non-contingent strategy, males do tend to exploit the situation by playing competitively while females do not. Males also do not play competitively against a tit-for-tat strategy where they could not exploit the opponent. The explanation does not seem to hold up for females playing against a non-contingent strategy without the added assumption that females find a contingent strategy aversive and thus play competitively to get even with the opponent.

Grant and Sermat (1969) found males to be more submissive than females in the chicken game, except against an opponent who was viewed as being inferior. In that case, there was very little difference between males and females in regard to exploitation. This result is contrary to the Accommodative-Exploitative hypothesis.

Situation

As discussed above, one cannot isolate which combination of the psychological traits of trust or competition is influencing the choice of move in the chicken game. But games can be set up to study one trait at a time by using what Rapoport calls "no conflict games."

The game shown in Figure 3 is dependent upon the trait of competition.

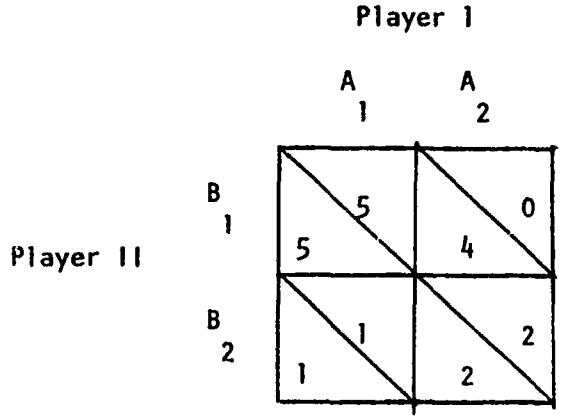

Figure 3. Competitive Game. Matrix II.

It was constructed such that the competitive choice (A_2) of player 1 can be explained only by a desire to maximize the difference between one's own and the other's payoff. The payoff matrix is such that the competitive choice enables the player to get a higher payoff than the other player, only by sacrificing "1" point. This is similar to the maximizing difference game developed by McClintock and McNeil (1966).

Switching cells II and III, produces a game that is dependent upon the trait of trust.

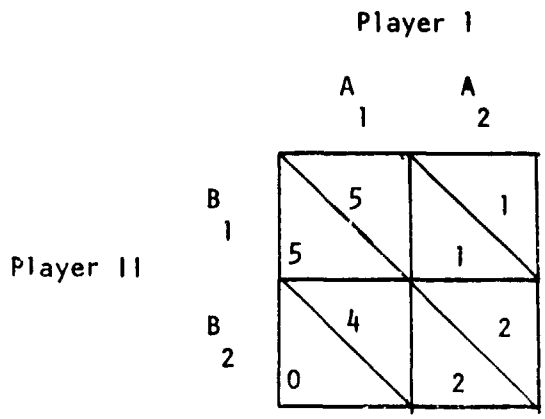

Figure 4. Trust Game. Matrix I.

Both of these games are classified by Rapoport and Guyer as no-conflict games with neither player having a dominating strategy. In the later form, the choice of A_2 by player I could be explained as follows: player I might feel that player II was competitive and would try to make player I take a lesser amount than himself; thus, player II is going to choose B_2. If player II chooses B_2, then player I is best off by choosing A_2. In this way, he would get two points instead of zero points. This form of behavior reflects an underlying distrust of other people.

Thus far, we have discussed two games and two different personality traits: trust and competition. The choice of move in the chicken game may be influenced by both of these traits. The two traits may interact in determining a person's strategy. For instance, if a person is trusting and competitive, he may choose the competitive move because he realizes that he can exploit the other person.

The games presented above each entail different types of problems for the participant. He is placed in a situation where he has two possible moves. The subject must make a decision regarding which move to make. Various questions may go through the subject's mind before making the final decision. The answer given and the final decision itself will reflect to some extent the person's personality. Such questions probably involve his view of man in general: is man greedy and out to get all he can, or is he cooperative, dividing scarce commodities equally between people? Is it worth the risk of getting a low reward to try for a higher amount, or is it better to take the security? Is the chance of gain worth the associated risk? These questions that may be raised in the experimental session are seen as similar to those that

occur in everyday interpersonal situations.

This study involves two personality traits that seem related to many of the questions that can be raised in experimental games: trust and competition. Two games were chosen that seemed to elicit one of these traits and one game was chosen which elicited both.

A model is developed which will predict from personality characteristics as measured by a paper and pencil test, and from the games which elicit one trait each, what choice will be made in a chicken game.

It is hypothesized that:

1. There will be a monotonic relationship between the level of trust and the choice of move on the trust matrix; distrust showing the least cooperation and trust showing the most. The degree of trust will be measured by Leary's Interpersonal Checklist (1954). (Appendix A).

2. There will be a monotonic relationship between degrees of competitiveness and the choice of move in a competitive matrix; high competitors choosing the competitive choice, and low competitors being cooperative. Competitive scores will be determined by Leary's Interpersonal Checklist.

3. The interaction of the two traits will predict which choice the subject will make in the chicken game; those high on trust and high on competition will choose cell A_2; those high on trust and low on competition will choose A_1; those low on trust and low on competition will choose A_2; and those low on trust and high on competition will choose A_2. (See Figure 2 for matrix.)

4. The choice of move on the first two matrices will predict the move on the chicken move. Those who cooperate on Matrix 1 and

Matrix II (C-C) will cooperate on the chicken game. Those who defect on one or both matrices will defect on Matrix III.

Method

Subjects: Subjects in this study were 162 Michigan State University students selected from a pool of approximately 500 students who responded to an advertisement in the student newspaper. The selection was on the basis of pre-test scores on the Leary Interpersonal Checklist. A subject was selected for participation if he scored either below the 33rd percentile or above the 67th percentile on both the trust and competitive sub-scales of the checklist of this sample.

Apparatus and Materials: The stimuli were 2 x 2 matrices presented on a rear projection screen. There were four lights, one on each corner of the screen that gave the Ss the information of which cell had been chosen.

A small box was used to indicate the Ss response. A light on this box was used as a signal to the Ss as to when to make their response. The response was indicated by pressing one of two buttons on the box. There was also a pair of earphones for each S over which all instructions were given. The equipment was controlled by a PDP8/1 computer.

Procedure: The session began after each S was seated in his individual cubicle. They were then given a short questionnaire which consisted of six essay questions. Ss were allowed to spend five minutes on each question for a total of 30 minutes.

When everyone had completed this task, the form was collected and

all were instructed to put on their earphones. The subjects were told that they were participating in a game in which they could earn a certain amount of money. The game was explained in detail while an instruction slide was presented on the screen. The instruction slide was a 2 x 2 matrix that was similar to the subsequent experimental matrices. The instruction matrix is shown in Figure 5.

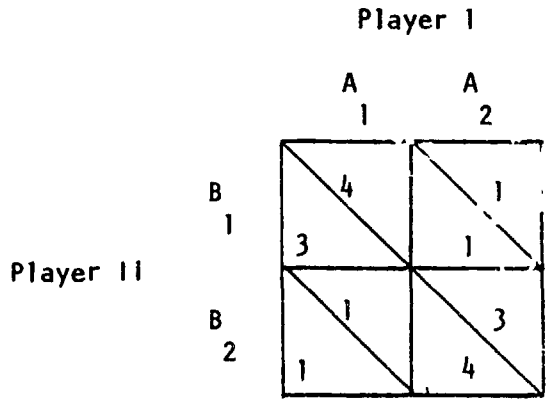

Figure 5. Instruction Game.

Students were asked questions about the payoff structure to determine whether they understood the matrix. When everyone answered two questions in a row correctly, it was assumed the matrix was understood.

When it was established that each S understood the game, the instruction matrix was changed to one of the "trivial" matrices. For half of the groups, the trust matrix (hereafter referred to as Matrix I) was played first. (See Figure 4.) For the remaining groups, the "competitive matrix" (Matrix II) was played first. (See Figure 3.)

Questions were asked about the matrix as before. After everyone had again answered two questions correctly, the Ss made their choice by pressing the button under the column of their choice. One second after the last person made his decision, the matrix was changed. The S who

was presented Matrix I first, was then presented with Matrix II. Those who saw Matrix II first, saw Matrix I second. The same procedure of testing for understanding the game was used for the second set as was for the first.

Next, a third matrix (Matrix III) was presented. This matrix fit the criterion of the game Rapoport and Guyer (1966) call "chicken". (See Figure 2.)

Questions were asked as before, until everyone answered two questions correctly. When this criteria of understanding was reached, the Ss made their choice of move. Matrix III was presented for nine more trials. After each trial, the Ss were given the information as to which cell had been selected by both himself and his partner. The Ss were informed that they were playing one of the other Ss for each game, and that each game would be played with a different partner. In actuality, Ss were playing against a preset program which cooperated on all but one trial. The defection took place on the third or seventh trial of the iterated chicken game.

The Ss did not know how many trials there would be. No communication was allowed between Ss and the doors of the room were partially closed to block any visual contact. (See Appendix B for instructions.)

Design: The variables of this experiment were: level of trust (high or low), level of competitiveness (high or low), sex of subject, order of presentation (Matrix I, Matrix II, Matrix III or Matrix II, Matrix I, Matrix III), and defection on the third or seventh trial. Each of the variables was dichotomous and thus the design was a 2^5 factorial.

For each group of four subjects, the independent variables of sex, order of matrix, and trial on which the programmed defection took place

remained constant, but whether their level of trust and competition was high or low varied within the group.

The dependent variables were the choice (1 or 2) of the subjects for each matrix. There was one dependent variable each for Matrix I and Matrix II and for the chicken game without information about payoff. For the chicken game with feedback, there were nine trials. The dependent variable being the average number of defections.

Results

Paper and Pencil Personality Tests

The two personality traits of trust and competitiveness were independent of each other (r = .014 for total sample; r = 0.00 for the extreme 80 scores).

Analysis: An analysis of variance was performed for each of the independent variables. Not all interactions were computable. There were some empty cells in the total analysis as half the subjects were eliminated from the analysis of the effects of personality traits on the different matrices. These subjects were not used because there were too many people with scores close to zero (or average) and the hypotheses were concerned with those who were extreme in the traits observed. The elimination of so many subjects after the study was run, made it impossible to ensure that all cells were filled.

To obtain all information available, the data were analyzed a number of times, always holding the personality trait variables constant, while changing the other variable submitted for analysis (sex or order).

An analysis of variance would not be computed for females since there was not enough subjects to fill each cell. Since the analysis of variance could not be computed, correlations for both males and females are included.

Hypothesis I, II, and III: Hypothesis I states that those who had high trust score on the Leary Checklist would cooperate on the trust matrix (Matrix ,, while those who had low trust scores would defect on that matrix. The test of this hypothesis indicated no effect (F = .001, df = 1,38).

Hypothesis II predicted that those who scored high on the competitive scale of the personality test would defect on the competitive matrix (Matrix II, while those who were low on competition would cooperate. This effect was also non-significant (F = 1.40, df = 1,38).

Hypothesis III postulated that the interaction between the two personality traits would predict the choice of move on the chicken game. It was expected that those who were high on trust and low on competition would cooperate while all others would defect. This proved to be insignificant (F = .030, df = 1,38). Table 1 presents the summary table for the analysis of variance.

Unexpected Findings: The competitive sub-scale of the personality test proved to be a significant predictor of the move chosen on the chicken game (F = 4.33, df = 1,38, $p < .05$). In the highly competitive group, 43% of the Ss defected, while in the low competitive group only 20% defected.

Sex Differences: Hypothesis I: the trust trait correlation with choice on Matrix I was higher for females but not for males (r = .28 for females; r = -.07 for males). This was not significant. The percentage of defections in the low trust group for females was 40%, while it was 15% in the high trust group. For males, 10% defected in the low trust group and 15% defected in the high trust group. For the males, competitive personality traits correlated more positively with the

Table 1. Summary of Analysis of Variance:
The Effects of Personality Traits in Different Matrices.

Trust subscale of Leary test	df	ms	F
trust matrix (Matrix I)	1	.0001	0.001
competitive matrix (Matrix II)	1	.0223	.1966
chicken (Matrix III)	1	1.442	1.44
Competitive subscale			
trust matrix (Matrix I)	1	.1182	.782
competitive matrix (Matrix II)	1	.1604	1.408
chicken	1	.843	4.331*
Sex			
trust matrix (Matrix I)	1	.224	1.482
competitive matrix (Matrix II)	1	.003	0.024
chicken	1	.030	0.1554
Order			
trust matrix (Matrix I)	1	.060	.4027
competitive matrix (Matrix II)	1	.007	.0633
chicken	1	1.201	6.17*
Trust X Competition			
trust matrix (Matrix I)	1	.4347	2.875
competitive matrix (Matrix II)	1	.0157	0.13
chicken	1	.0059	0.03

* $p < .05$.

choice of move on the trust game (r = .23) than for females (r = .05), but it was non-significant. Table 2 summarizes the correlations.

Hypothesis III states that the interaction of trust and competition should predict cooperation on the chicken game. The prediction was that the high trust, low competition (HT, LC) group would have the highest rate of cooperation, while the high trust, high competition group (HT, HC), the low trust, low competition (LT, LC), and the low trust, high competition (LT, HC) would have higher rates of defection.

Males in the HT, HC group defected more than the Ss in all other groups. Females did not show any interaction effects. The probability of cooperation could be predicted by the level of competition. Table 3 contains the percentage of defections for the four groups.

Matrix I and Matrix II as Predictors of Matrix III: Hypothesis IV states that those who cooperated on Matrix I and cooperated on Matrix II (C-C) were expected to cooperate on the chicken game. The other three groups (cooperate on Matrix I, defect on Matrix II (C-D); defect on Matrix I, cooperate on Matrix II (D-C); and defect on both (D-D)) were expected to defect on the third matrix.

On the first trial of chicken, the hypothesis was not supported. All groups had high levels of cooperation (C-C, 71% cooperation; C-D, 69%; D-C, 75%; and D-D, 70%). Table 4 contains the summary of percentages of defection on the chicken game for the four groups based on previous moves.

Iterated Chicken Game

Hypothesis IV: The results as derived from hypothesis IV were expected to be the same on each trial of the iterated chicken game as the one trial game of chicken. For the first trial, the hypothesis predicted

Table 2. Correlations: Personality Traits for Males and Females as It Effects the Different Matrices.

Male	
Trust subscale	r
Matrix I	-0.076
Matrix II	0.076
Matrix III	-0.109
Competitive subscale	
Matrix I	.2268
Matrix II	- .2268
Matrix III	.2182
Female	
Trust subscale	
Matrix I	.280
Matrix II	.000
Matrix III	.053
Competitive subscale	
Matrix I	0.056
Matrix II	0.000
Matrix III	0.267

Table 3. Percentage of Defections on Different Matrices, by Personality Traits.

	Males			Females			Total			
	TG	Comp.	Chick.	TG	Comp.	Chick.	TG	Comp.	Chick.	Total
HT HC	.3	0	.5	.2	.3	.4	.25	.05	.45	.25
HT LC	0	.2	.2	.1	.2	.2	.05	.2	.2	.15
LT HC	.1	.1	.3	.4	.2	.5	.25	.15	.4	.27
LT LC	.1	.2	.2	.4	.1	.2	.25	.15	.20	.22

Table 4. Percentage of Defection on Matrix III by Moves on Matrices I and II in Total Sample.

	Matrix III First Chicken Game	First Iterated Chicken Game	Second Iterated Chicken Game
Males			
CC	31%	27%	33%
CD	17%	50%	50%
DC	33%	22%	22%
DD	40%	60%	60%
Females			
CC	27%	28%	28%
CD	45%	63%	54%
DC	17%	25%	33%
DD	20%	40%	40%
Total			
CC	29%	28%	31%
CD	31%	57%	52%
DC	25%	24%	28%
DD	30%	50%	50%

the level of defection correctly on all but the D-C group; C-D and D-D groups both had high levels of defection (57% and 50% respectively), while the C-C had only 28% defection. The D-C group defected even less than the C-C group (24%). The second trial of chicken remained in that same pattern for the four groups, C-C and D-C being low in the level of defection, while C-D and D-D remained high.

Unexpected Findings: The move on Matrix II (competitive game) tends to be a significant predictor of behavior in the chicken game. Those who choose the competitive move on Matrix II, tended to defect on the iterated chicken game for games one and two. This was regardless of the move on Matrix I (first game). (See Table 5 for t tests.)

	Males	Females
Matrix III First chicken game	t=1.0	t=1.0
First iterated chicken game	t=5.3**	t=2.72*
Second iterated chicken game	t=7.3**	t=1.8

* $p < .05$.

** $p < .01$.

Table 5. Summary of t Tests.
Competition Game as a Predictor of Move on Chicken Game.

Level of Defection over Time

There were an increasing number of defections on each trial of the chicken game, except on the trial after the programmed defection. When a defection occurred on the third trial, there was a non-significant

decrease in the number of Ss defecting. Females stayed at this lower level for the rest of the trials, while the number of males who defected started to increase after three trials had passed ($t = 3.8$, $df = 3.8$, $p < .05$). When the programmed defection occurred on the seventh trial, there was a large decrease in the number of Ss defecting on the next trial, significant at the .05 level for both males and females. On the following trial, females increased in their number of defections to the level prior to defections ($t = 3$, $df = 41$, $p < .05$), while males did not increase their level of defection ($t = 0$). (See Figures 6 and 7, and Table 6.)

Figure 6

Number of Defections over Time: Females

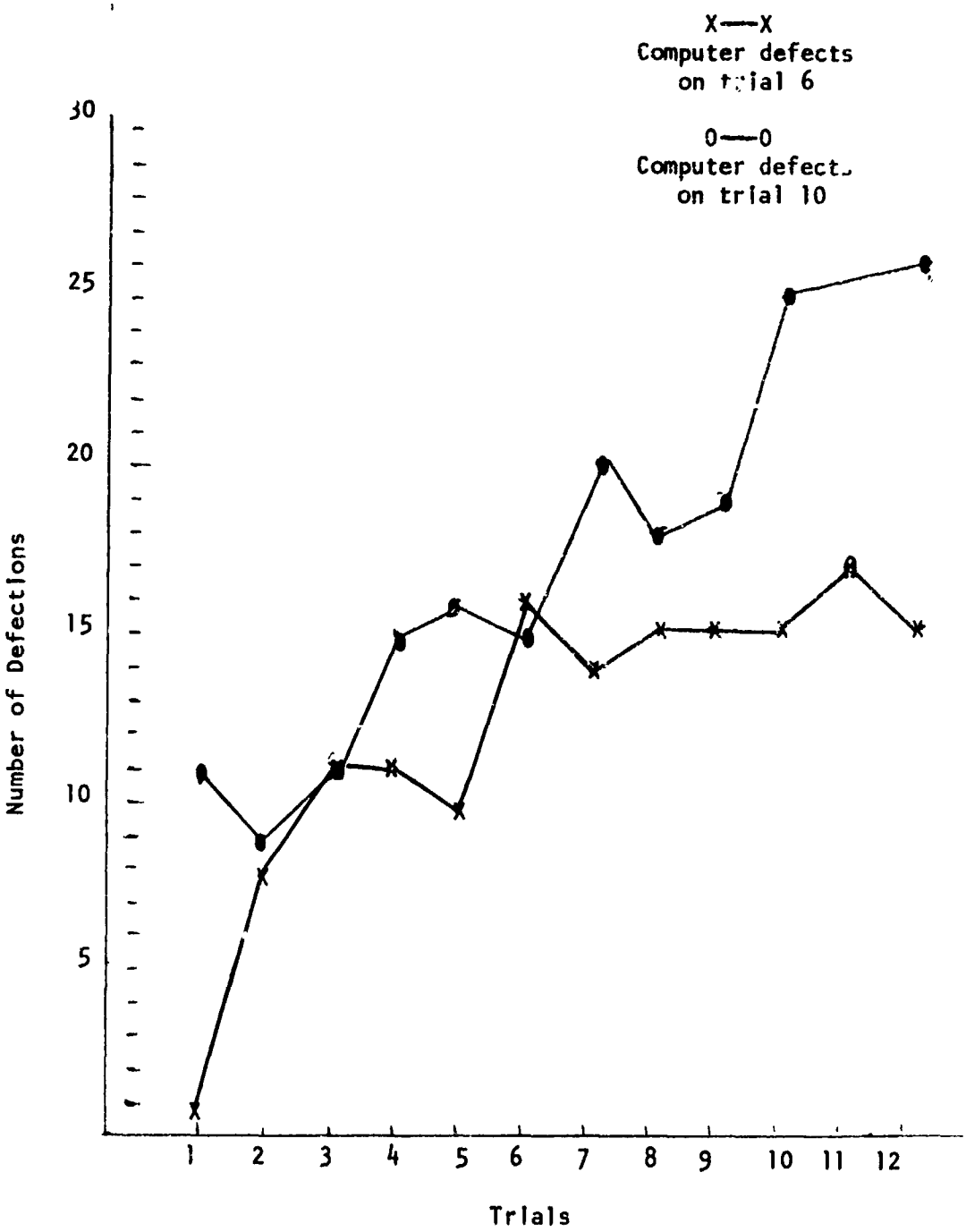

Figure 7

Number of Defections over Time: Males

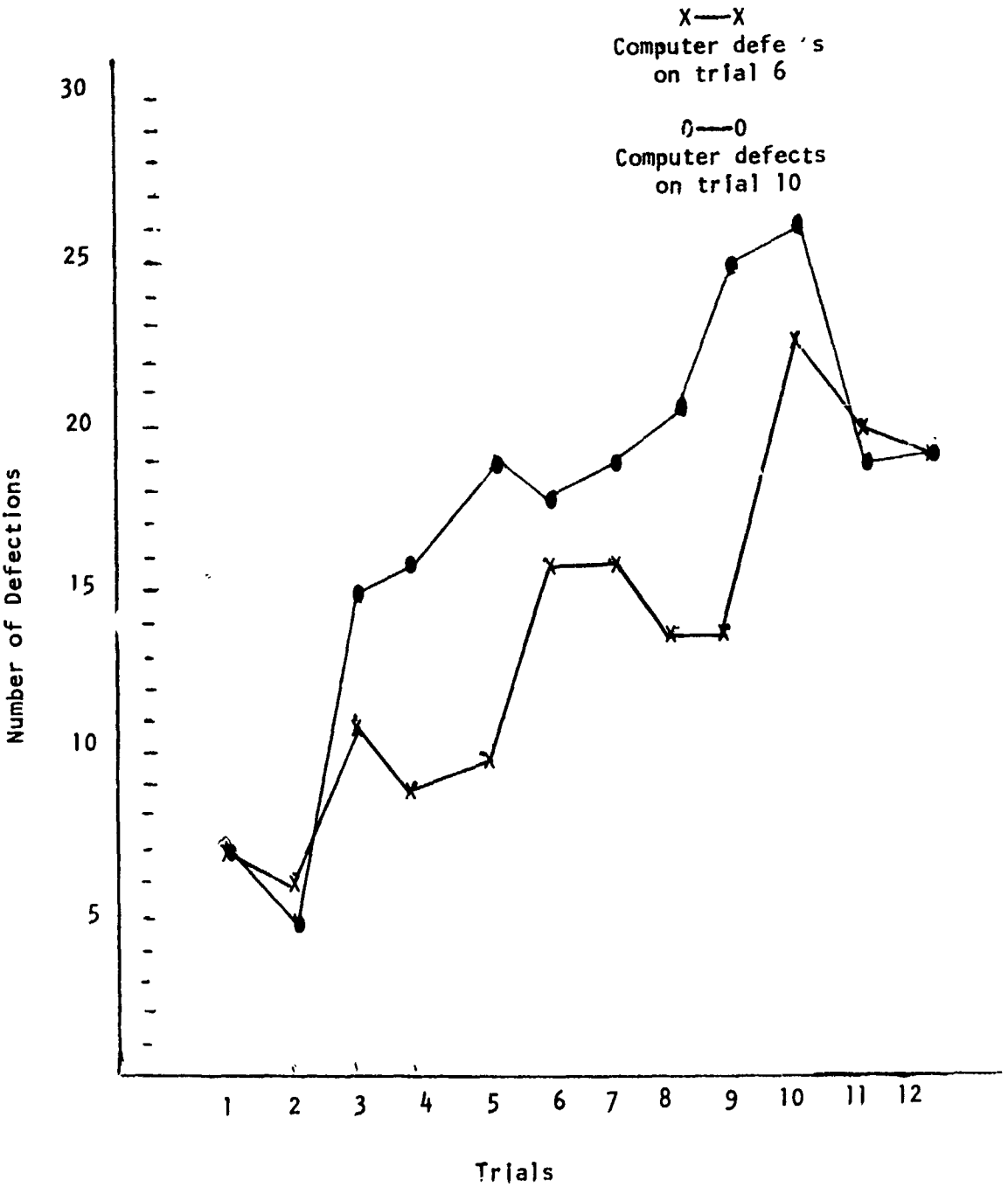

Table 6. Summary of t-Tests, Males and Females over Period of Trials

Males		Females	
Computer defects on trial 6		Computer defects on trial 6	
trial 6, 7	t=0, df=39	trial 6, 7	t=.02, df=34
trial 9, 10	t=3.8, df=39*	trial 7, 8	t=.36, df=34
Computer defects on trial 10		trial 10, 11	t=.56, df=34
trial 10, 11	t=2.28, df=43*	trial 11, 12	t=0, df=34
trial 11, 12	t=0, df=43	Computer defects on trial 10	
		trial 10, 11	t=3.0, df=41*
		trial 11, 12	t=3.14, df=41*

* $p < .05$

Discussion

Only the 80 most extreme scores on both subsets of the Interpersonal Checklist were used in the final analysis since most of the scores clustered around 0, even when using people who scored below the 33rd percentile or above the 67th percentile on both the trust and competition subscales of the checklist.

Personality Scores

The personality scores did not predict the choice of move for any of the hypotheses, but the competitive subscale was a significant predictor of the move on the chicken game.

Since neither trust nor the interaction of trust and competition was significant, it did not seem to matter whether or not subjects trusted the other person to cooperate or not; they still risked possible greater loss to earn extra points. A possible explanation is that everyone believed that their opponent would cooperate, regardless of their scores on the trust subscale of the personality test. Unfortunately, unlike Halpin and Pilisuk, we did not collect information regarding what move Ss thought the other person would choose.

The choice of move on the trust matrix was predicted for females by their score on the trust personality test, but the choice of move for males was predicted by the competitive subscale of the test. The males who are competitive seem to project their own competitive urges

on others. They see others as trying to "exploit" them, so they play the minimax move. Another possibility is that the competitive male is actually more interested in not losing when there is no way of getting more than his opponent. He may view the game as having a possibility of losing or trying; so rather than earn more money by choosing the co-operative move and take a chance on losing, he plays non-cooperatively. It seems that the competitive trait overrides the trust trait for males in the competitive situation of game playing. This explanation, of course, needs further research.

Response on the competitive matrix (Matrix II) is not predictable by either subscale. The reasons may be varied. Competition is a complicated trait, and the personality scale may be measuring a different type of competitiveness than what is involved in the game. The personality scale seems to be getting at a more self-interest type of competition while the game is measuring "competition against another" or a desire to beat the other person. Another possibility is that the game itself does not have a big enough payoff to elicit a competitive move from a competitive person.

Matrix I and Matrix II Predicting Matrix III: It seems that competition overrides the trait of trust. In the groups where Ss defected on the competition game, they tended to defect on the chicken game, as predicted. If the defection took place during the trust game, there was no tendency to defect on the chicken game. Thus, though the chicken game was supposed to be a "mixed motive" game, it seems that competition is an important motive which may be a sufficient predictor of the move to be chosen on this game. Whether competition overrides trust just in this mixed motive experimental game, or whether it will occur in

other games or "real life" situations requires more research.

Level of Defection over Time: As Ss became more secure that the other person was cooperating, there was a greater tendency to take advantage of that cooperation. When a preprogrammed defection took place, the security of total cooperation was broken, and Ss went back to more cooperation. The breakdown in security affected the choice of move differently if defection took place in the first half or second half of the sequence, and there was a different reaction for males and females.

Since there is an appreciable increase on each trial in the number of Ss defecting, it is reasonable to assume that there is a smaller decrease in the number of Ss who defect early in the sequence rather than later in the sequence. What is puzzling is the difference between males and females in the behavior on the moves following the defection. Females cooperate more when the defection occurs early in the sequence. They may take this as a warning that unless they cooperate, they'll both receive low points; but when it happens later in the sequence, they may feel it is an "unusual move" since there has been no other previous defection. When it does not happen on the following move, they revert back to their original strategy. Males have a different pattern of behavior when responding to a programmed defection. When the programmed defection occurs on the third trial, defection rates increase to the previous level within three trials. When the defection occurred later in the sequence, there were less defections for the rest of the trials. If there were three or more trials after the defection, males might have exhibited a similar strategy as when the defection occurred earlier. They might be waiting three trials before they try a defection strategy to see what their opponent is doing. Thus, males,

more than females, might be waiting to see the strategy of their opponent before committing themselves to the risky move.

One of the problems with this design was that each matrix should have been tested with different payoffs to find one that would elicit a greater amount of defection. This would have made for a more reliable analysis.

Another possible way to test the trust scale would be to ask the Ss to predict the other person's move and then allow him to play this choice. This would give a clearer idea if trust is being "overruled" by the competition trait.

Summary

This study seems to indicate that personality does play a part in choice of move in an experimental game though not in the way expected. Whether this proves to be true in real life situations, where the stress may be stronger and more realistic, only more research will show.

Another finding that needs further research is the differential findings for men and women. The way the two sexes reacted in the trivial trust game is something that bears further study. Why did one sex, the males, find it a competitive situation while the females used trust of others to decide their move. It should be remembered that while females conformed to the hypothesis and males did not, the definition of the situation was made by a female. It just may be worth exploring the idea that trust is defined by males and females differently. Since the experiment was designed by a female, the matrix chosen may be one that elicits trust only for women. Possibly, if the study were designed by a man, different matrices would be chosen which would "work" for men. The study shows some evidence of sex differences as other findings have, but cannot offer an explanation that includes the other findings as well as its own. There has been too little work to offer a consistent explanation.

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APPENDIX A

LEARY'S INTERPERSONAL CHECKLIST

INTERPERSONAL CHECKLIST ITEMS BY SECTORS

Weights	A	B
4	Dictatorial	Egotistical and conceited
3	Bossy	Boastful
3	Dominating	Somewhat snobbish
3	Manages others	Proud and self-satisfied
2	Forceful	Independent
2	Good leader	Self-confident
2	Likes responsibility	Self-reliant and assertive
1	Able to give orders	Self-respecting

Weights	C	D
4	Cold and unfeeling	Cruel and unkind
3	Thinks only of self	Sarcastic
3	Shrewd and calculating	Self-seeking
3	Selfish	Impatient with others' mistakes
2	Businesslike	Stern but fair
2	Can be indifferent to others	Hard-boiled when necessary
2	Likes to compete with others	Firm but just
1	Able to take care of self	Can be strict if necessary

INTERPERSONAL CHECKLIST ITEMS BY SECTORS

Weights	E	F
4	Hard-hearted	Rebels against everything
3	Frequently angry	Bitter
3	Outspoken	Complaining
3	Often unfriendly	Resentful
2	Irritable	Skeptical
2	Critical of others	Often gloomy
2	Straightforward and direct	Resents being bossed
1	Can be frank and honest	Can complain if necessary

Weights	G	H
4	Distrusts everybody	Always ashamed of self
3	Jealous	Timid
3	Stubborn	Self-punishing
3	Slow to forgive a wrong	Shy
2	Hard to impress	Easily embarrassed
2	Frequently disappointed	Lacks self-confidence
2	Touchy and easily hurt	Apologetic
1	Able to doubt others	Able to criticize

INTERPERSONAL CHECKLIST ITEMS BY SECTORS

Weights	I	J
4	Spineless	Clinging vine
3	Meek	Hardly ever talks back
3	Passive and unaggressive	Dependent
3	Obeys too willingly	Wants to be led
2	Easily led	Admires and imitates others
2	Modest	Often helped by others
2	Easily gives in	Very respectful to authority
1	Can be obedient	Grateful

Weights	K	L
4	Will believe anyone	Agrees with everyone
3	Easily fooled	Wants everyone's love
3	Likes to be taken care of	Will confide in anyone
3	Lets others make decisions	Too easily influenced by friends
2	Accepts advice readily	Wants everyone to like him
2	Very anxious to be approved of	Always agreeable and pleasant
2	Trusting and eager to please	Eager to get along with others
1	Appreciative	Cooperative

INTERPERSONAL CHECKLIST ITEMS BY SECTORS

Weights	M	N
4	Loves everyone	Tries to comfort everyone
3	Fond of everyone	Oversympathetic
3	Likes everybody	Forgives anything
3	Friendly all of the time	Too lenient with others
2	Warm	Encouraging of others
2	Sociable and neighborly	Tender and soft-hearted
2	Affectionate and understanding	Kind and reassuring
1	Friendly	Considerate

Weights	O	P
4	Spoils people with kindness	Expects everyone to admire him
3	Overprotective	Tries to be too successful
3	Generous to a fault	Acts important
3	Too willing to give to others	Always giving advice
2	Big-hearted and unselfish	Often admired
2	Enjoys taking care of others	Makes a good impression
2	Good leader	Respected by others
1	Helpful	Well thought of

Instructions

You are going to play a game which will enable you to win a certain amount of money. This amount will not be determined by only you. But rather, the amount won by you and your partner will depend on what move each of you makes. The sum of the amount earned in all games you will play will be your pay for participating.

There are 4 people who are participating in this research at this moment. Each of you will play a number of different games with different people. You will not know who you are playing at each game. You will not be able to see or talk to your partner.

You will be asked questions throughout this session. Please answer yes or no. Yes will be the [left or right] button in front of the screen. The question will be ... is there a slide on the screen in front of you. Please answer yes or no. (The light in front of you will go on, when you are supposed to answer. This will be called the ready light from now on.) The game is played as follows:

You will notice on the screen in front of you a chart consisting of four squares each of which will be called a cell. Each of these cells contains the possible points which you or your partner can earn for any game. In each game, there are four possible sets of points that you and the other person can earn. Your points will be the ones in the red shaded part of each cell, the clear area in the same cell will be the other player's points. These points will be converted into money at the end of these sessions at 5¢ a point.

The cell that is selected will be determined by which column you choose and which row your partner chooses in the following manner. You may chose either the column on the left (1) or the column on the right

(2). You indicate your choice by pressing the button that before was indicating yes or no. Now it means left column, left button and the right column, right button. Your partner at the same time chooses either the upper row (1) or the lower row (2). If you chose column 1, you push the left button, then your points are read from the left hand squares. You will get either 3 points or 1 point, depending upon which row your partner chooses. If he chooses row 1, then you will get 3 points, while he will get 4. If he chooses row 2, you both will get 1.

If you had chosen column 2, the right button, you would have read either 1 point or 4 points. If your partner chose 1, you both would have read 1. If he had chosen row 2 while you had chosen column 2, you would have read 4, while he got 3.

When you have made your decision on which column to pick for a given trial, press the button under the column of your choice. Do not make a choice until the right light is on.

An easy way to understand this is to draw an imaginary line through your choice (column 1 or 2), and an imaginary line through the other person's possible choices. Where these meet, is the square that determines your pay. Remember the amount of points that you receive is in the red shaded area, while your opponent's points are in the clear area.

All of you are responding by making column choices, but your partner's chart is reversed, so that their chart is the equivalent of being your rows. Our equipment records the choices, and calculates the appropriate scores.

I will ask questions to make sure that you understand the slide. This is just the instruction slide...questions....

This is the first game that you will play...I'm going to give you

an example of the different choices that you may make. Tell me if it is correct or not by answering yes or no. Do not make your decision until I tell you it is a decision trial and the ready light for that trial is on.

Questions

See Figure 5: Instruction Slide.

1. You chose the right hand column and your partner chose the upper row, you both get 1. Yes or no.

2. You chose the left hand column and your partner chose the upper row, you get 3 and your partner gets 4. Yes or no.

3. You chose the right hand column and your partner chose the bottom row, you get 4 and your partner gets 3. Yes or no.

4. You chose the left hand column and your partner chose the bottom row, you both get 1. Yes or no.

See Figure 3.

1. Did your slide change. Yes or no. I am going to ask you a few questions to make sure you understand this slide.

2. You chose the left hand column and your partner chose the upper row, you both get 5. Yes or no.

3. You chose the right hand column and your partner chose the upper row, you get 4 and your partner gets 0. Yes or no.

4. You chose the right hand column and your partner chose the bottom row, you both get 5. Yes or no.

5. You chose the left hand column and your partner chose the bottom row, you both get 1. Yes or no.

Make your decision by pressing the button under the column of your choice when the ready light goes on.

See Figure 4.

I will now ask a few questions about the slide to make sure that you understand it.

1. Did your slide change. Yes or no.

2. You chose the right hand column and your partner chose the upper row, you both get 1. Yes or no.

3. You chose the left hand column and your partner chose the upper row, you both get 2. Yes or no.

4. You chose the left hand column and your partner chose the bottom row, you get 4 and your partner gets 0. Yes or no.

5. You chose the right hand column and your partner chose the bottom row, you both get 2. Yes or no.

Make your decision now and indicate it by pushing the button under the column of your choice when the ready light goes on.

See Figure 1.

1. Has your slide changed. Yes or no.

2. You chose the left hand column and your partner chose the upper row, you both get 3. Yes or no.

3. You chose the right hand column and your partner chose the upper row, you get 4 and your partner gets 2. Yes or no.

4. You chose the right hand column and your partner chose the bottom row, you both get 1. Yes or no.

5. You chose the left hand column and your partner chose the bottom row, you get 2 and your partner gets 4. Yes or no.

Make your decision now and indicate it by pushing the button under the column of your choice when the ready light goes on.

We are now going to have a slightly different procedure. You are going to see the same slide for the next trials, but you are now going to receive information about how much money you are earning. Remember each trial will be with a different person and you will be getting 5¢ a point.

The way you will receive this information is by the four lights outside the screen. One will go on to indicate which cell you are in. If you had chosen the right column and your partner chose the upper row, the light by the upper right hand corner will go on, since you are in the upper right hand cell.

If the other person had chosen the bottom row and you had stayed in the same cell, the light in the lower right hand side would go on, since you are in the bottom right hand cell.

Another way to look at this is that the light that goes on indicates the cell that you have chosen by being in the same position as the cell.

Remember your points will be in the shaded area of the corresponding cell.

The sequence of events will be: a ready light will go on; you will make your decision; one of the four lights will go on to indicate which cell you are in; the ready light will go on again and you will make your decision; then one of the four lights will go on to indicate which cell you are in. This will continue until the end of the session.